

Chapter 4 Project

Quadratic functions can be used to model many things in real life, from trajectories to growth of populations. On any planet, the height h (in feet) of a falling object t seconds after it is dropped can be dropped by $h = -\frac{1}{2}gt^2 + v_0t + h_0$ where h_0 is the object's initial height (in feet) and g is the acceleration (in feet per second squared) due to gravity. The table below shows the acceleration due to gravity for four planets.

Planet	Earth	Mars	Jupiter	Saturn
G (ft/sec ²)	32	12	76	30

1. For each planet in the table, find the time it takes for a rock dropped from a height of 150 feet to hit the surface.

a) Earth

b) Mars

c) Jupiter

d) Saturn

Below is a photograph of the Kingda Ka roller coaster located at Six Flags Great Adventure in New Jersey. It is the tallest and fastest roller coaster in the world! The train is launched by a hydraulic mechanism to 128 miles per hour in 3.5 seconds. At the end of the launch track, the train climbs the main top hat tower (shown in the picture), reaching a height of 456 feet. Notice that the roller coaster track is shaped like a parabola, which is why it can be modeled by a quadratic function.



A function that can be used to model this portion of the coaster is:

where x represents the horizontal distance in relation to the vertical height y .

2. How far apart are the beginning and end of the track when the car has a height of 315 feet?

3. Come up with your own real-life example of a quadratic function! Take a picture of something that is shaped like a parabola, print it, put a coordinate plane on it, and find the equation of the parabola.